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CONSUMPTION OF PONDEROSA PINE SEED BY SMALL MAMMALS

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Small mammals (mice, chipmunks, and shrews) are known to destroy conifer seed by eating or cacheing them. Foresters generally recognize that such destruction retards reforestation by both natural and artificial seeding. In order to apply these general principles in forest management, it is desirable to know for specific types and locations which animals are the principal consumers of seed. This report describes a recent study of the relative importance of different small mammals in destroying most of the heavy 1948 ponderosa pine seed crop on the Bluesky Creek timber sale area of the Kootenai National Forest in northwestern Montana.

The study of seed consumption by different small mammals was undertaken in conjunction with a test of soil scarification and slash burning to improve seedbed conditions. 2/ The experiment is located in a recently cut ponderosa pine stand. Seed trap studies showed that only 5,800 sound ponderosa pine seed per acre remained on May 3, 1949, out of the 75,400 sound seed which were disseminated during the previous autumn and winter. 3/ Ponderosa pine seed at the rate of 5,800 per acre would be more than ample for restocking a stand if high germination and seedling survival could be assured. Unfortunately, seed may fail to germinate, and young seedlings are likely to be decimated by destructive agents such as damping off, drought, and insects. In view of the expectation of further substantial losses, destruction of 92 percent of the seed before germination begins is a critical loss.

1/ In cooperation with the Northern Rocky Mountain Forest and Range Experiment Station.

2/ Can We Induce Prompt Regeneration in Selectively Cut Ponderosa Pine Stands, by Arthur L. Roe and A. E. Squillace, Northern Rocky Mountain Forest and Range Experiment Station, Research Note No. 81. March,1950.

3/ Dispersal and Survival of Seed in a Partially-cut Ponderosa Pine Stand, by A. E. Squillace and Lowell Adams, Northern Rocky Mountain Forest and Range Experiment Station, Research Note No. 79. March, 1950.

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The kinds and numbers of animals present were determined by trapping with common snap traps which were set in three rows. Each row contained 60 traps set in groups of three at 20 locations. The locations were 25 feet apart. The traps were set for three nights in the autumn, September 8, 9, and 10, 1948, and three nights the next spring, May 3, 4, and 5, 1949. By way of comparison, similar trapping was carried on in two sample areas in the white pine type on the Deception Creek Experimental Forest in Idaho. One of these sample areas, Ames Creek, has been clear-cut. The other, Montford Creek, supports a mature, virgin white pine stand.

Six kinds of small mammals were found at Bluesky Creek. Columbian white-footed mice /Peromyscus maniculatus artemisiae (Rhoads)_7 were the principal animals caught both autumn and spring (table 1). They considerably exceeded in numbers the combined totals of all others. Long-tailed meadow mice /Microtus mordax mordax (Merriam)_7 were second in numbers caught, and buff-bellied chipmunks /Eutamias ameonus luteiventris (Allen)_7 were third. Only a few specimens of Kootenai red-backed mice /Clethrionomys gapperi saturatus (Rhoads)_7, Rocky Mountain phenacomys (Phenacomys intermedius intermedius Merriam), and gray shrews (Sorex cinereus cinereus Kerr) were captured.

Table 1.--Catch of small mammals in 540 trap-nights at Bluesky Creek

Species	Animals caught		Animals caught per trap-night	
	Fall 1948	Spring 1949	Fall 1948	Spring 1949
	Number	Number	Number	Number
Columbian white-footed mouse	52	38	0.096	0.070
Long-tailed meadow mouse	4	10	.007	.018
Kootenai red-backed mouse	0	1	.000	.002
Rocky Mountain phenacomys	1	0	.002	.000
Buff-bellied chipmunk	4	2	.007	.004
Gray shrew	2	0	.004	.000

Bluesky Creek had a remarkably high white-footed mouse population in comparison with the sample areas, Ames Creek and Montford Creek, on the Deception Creek Experimental Forest. For example, at Bluesky Creek, the trap-night ratio in the autumn was 0.096 in contrast to 0.017 at Montford Creek and 0.008 at Ames Creek (table 2). Mr. Winton Wedemeyer reported that these mice had shown marked increase on his ranch 20 miles northeast of the Bluesky Creek sale area in the past two years.

Table 2.--Comparisons of animal numbers caught per trap-night at Deception Creek, Idaho, and Bluesky Creek, Montana

Species	Fall 1948			Spring 1949		
	Ames Creek	Montford Creek	Bluesky Creek	Ames Creek	Montford Creek	Bluesky Creek
White-footed mice	0.008	0.017	0.096	0.006	0.017	0.070
Meadow mice	.013	.003	.007	.013	.000	.018
Red-backed mice	.000	.006	.000	.000	.000	.002
Phenacomys	.000	.000	.002	.000	.000	.000
Chipmunks	.011	.000	.007	.000	.000	.004
Shrews	.008	.013	.004	.008	.011	.000

The great abundance of the white-footed mice is important in view of their preference for ponderosa pine seed, as shown by stomach examinations. The white-footed mice and the chipmunks were the chief pine seed eaters (table 3). The relative amounts of seed eaten were determined by examining the stomach contents of the animals that were caught in the traps. The ponderosa pine seed were readily identifiable in most of the stomachs by the tough, brown, inner seed coat which resisted chewing and appeared almost intact in the stomachs.

Table 3.--Ponderosa pine seeds found in the stomachs of white-footed mice and chipmunks

Species	Fall 1948			Spring 1949		
	Stomachs examined	Seeds (total)	Average seeds per stomach	Stomachs examined	Seeds (total)	Average seeds per stomach
	Number	Number	Number	Number	Number	Number
White-footed mice	52	310	5.96	38	91	2.39
Chipmunks	2	1/26	1/13.00	2	3	1.50

1/ Includes 24 in cheek pouches, not in stomach.

The stomachs of the meadow mice, red-backed mouse, and phenacomys apparently contained no pine seed parts. Their contents were too finely chewed to permit identification of the inner seed coat if any were present. However, the mass of their stomach contents was green, as contrasted with the brown and white color of the stomach contents of the seed-eating white-footed mice and chipmunks. This indicated that the green material probably did not contain pine seed. The stomach contents of the one shrew examined were also too finely chewed to identify. However, their general appearance also suggested that no seed were present.

The study shows clearly that certain small mammals, especially the white-footed mice and chipmunks consume substantial numbers of ponderosa pine seed. It does not indicate absolute numbers eaten during specified periods. However, the fact that white-footed mice and chipmunks show a marked preference for pine seed, combined with the large population of the mice present on the area, makes it entirely reasonable to assume that most of the seed that were lost between the time of shedding and sprouting were eaten by the mice and chipmunks.

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